(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 915 436 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
12.05.1999 Bulletin 1999/19

(51) Int Cl.[6]: G07D 9/00, B65H 29/58

(21) Application number: 98308822.0

(22) Date of filing: 28.10.1998

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: 05.11.1997 GB 9723300
12.01.1998 GB 9800431

(71) Applicant: NCR INTERNATIONAL INC.
Dayton, Ohio 45479 (US)

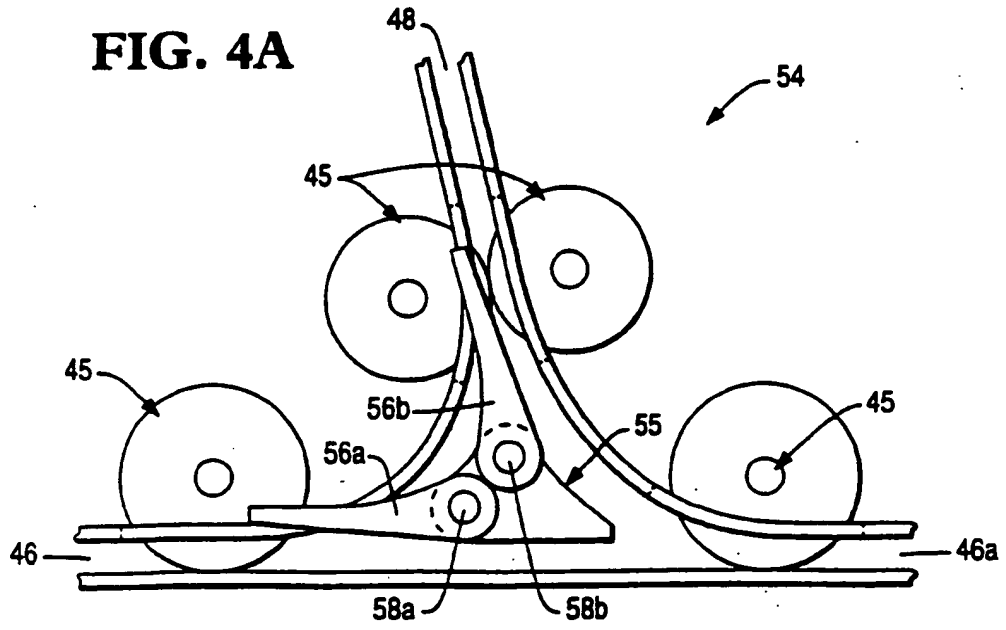
(72) Inventors:
- Patterson, David
  Dundee, Scotland DD2 1BQ (GB)
- Halket, Andrew R.B.
  Cherry Hinton, Cambridge CB1 4GG (GB)

(74) Representative: Cleary, Fidelma et al
International IP Department
NCR Limited
206 Marylebone Road
London NW1 6LY (GB)

(54) Document routing mechanism

(57) When selected documents travelling along a first feed path (46) are to be fed to a second feed path (48), a solenoid is energised causing pivotal movement of a pair of flipper arms (56a, 56b) so as to direct the documents onto the second feed path (48). When the solenoid is de-energised, documents on the first feed path (46) may proceed to the continuation portion thereof i.e., path (46a), or documents from the second feed path (48) may be fed to the continuation portion (46a) of the first feed path (46). The flipper arms (56a, 56b) are coupled by gearing mechanisms so that they are moveable relative to each other, pivotal movement of one flipper arm (56a, 56b) causing pivotal movement of the other arm (56a, 56b). Such relative movement between the flipper arms (56a, 56b) allows for a compact and reliable structure and activation of the mechanism is required only when documents are to be fed from the first feed path (46) to the second feed path (48).

FIG. 4A



EP 0 915 436 A1

a display screen 20, a receipt printer slot 22 through which a receipt for a transaction is delivered to the user at the end of a transaction and additional keytips at the sides of the screen 20 to facilitate selection of options or confirmation of information displayed on the screen 20. The card reader, cash dispenser and receipt printer modules associated with the respective slots 14, 18 and 22 in the user panel 12 of the ATM 10, are designated by the same reference numerals in Fig. 2. In a typical ATM transaction, a user inserts his card into the card reader slot 14 and data encoded on the card is read. Instructions are then displayed on the screen 20. The user is requested to enter a personal identification number (PIN) on the key pad 16 which is verified, usually at a central location remote from the ATM 10. If the PIN is determined to be correct against information read from the inserted card, a menu of the various facilities available to the user is then displayed on the screen 20. If a cash withdrawal facility is selected, the user is requested to enter the sum required on the key pad 16 or by means of the additional keys 24 provided at the side of the screen 20.

[0014] The ATM 10 further comprises a controller unit 30 which communicates with components of the user panel 12 and with various other operating mechanisms of the ATM 10. The controller unit 30 includes a processor unit 32, and a memory unit 34 connected via a bus line 36 to the processor unit 32. The processor unit 32 receives input signals from the card reader 14, the key pad 16 and the additional keytips 24, and provides output signals to various mechanisms of the cash dispenser 18, to the display 20 and to the receipt printer 22. It should be understood that the processor unit 32 controls the amount of cash dispensed by the cash dispenser 18, the information displayed on the display 20 and the information printed by the receipt printer 22.

[0015] Referring now additionally to Figure 3, the various mechanisms within the cash dispenser 18 controlled by the processor unit 32 include a multiple note detector 62 for detecting the presence of multiple superposed currency notes, vacuum operated picker devices 44 for picking notes from currency cassettes 40, a transport mechanism 45 for transporting notes picked from one or more of the cassettes 40 or dispensed from an auxiliary storage device 52, a document routing mechanism 50 for selectively directing picked notes towards an auxiliary storage device 52 for storage and for directing notes dispensed from the auxiliary storage device 52 toward a stacking wheel 70 and a drive motor 53 of an auxiliary storage device 52. The processor unit 32 may include a microcomputer, and the memory unit 34 may be a non-volatile RAM. Suitable computers and memories are readily available in the marketplace. Their structure and operation are well known and therefore will not be described.

[0016] The main operating parts of the cash dispenser 18 embodying the invention will now be described with particular reference to Fig. 3. Stacks of currency notes 38 are held in the cassettes 40, the cassettes being slidably mounted in compartments 42 and each holding notes of different denominations. The picker devices 44 serve to extract notes from each cassette 40. The transport mechanism 45 is associated with a three feed paths 46, 46a and 48 linked by a document routing mechanism 50 and serves to transfer notes from one location to another within the ATM 10. The document routing mechanism 50 is controlled by the controller unit 30 to pivot between different positions according to the selected path of transport of notes within the ATM 10.

[0017] The transport mechanism 45 transfers notes picked from the cassettes 40 along a first unidirectional main feed path 46, either to a continuation portion of the main feed path 46, i.e. path 46a, for delivery to a customer, or to a second feed path 48 for delivery to an auxiliary storage device 52. Documents stored in the auxiliary storage device 52 can be returned to the continuation portion 46a of the main feed path 46 by means of the document routing mechanism 50 as will be described later. A diverter 60 is provided along the main feed path 46 to direct any mispicked notes which are detected by the multiple note detector 62 into a first reject bin 64.

[0018] A stacking wheel 70 and stripper plate assembly 72 are provided at the end of the continuation portion 46a of the main feed path 46, for stacking notes prior to being delivered to a customer through a shutter 89 associated with the cash dispenser slot 18 via a series of co-operating belts 80, 82, 84 and 86. The stacking wheel 70 comprises a plurality of stacking plates 74, spaced apart in parallel relationship along the shaft 75 of the stacking wheel 70, each stacking plate 74 incorporating a series of curved tines 77 which pass between fingers 78 of the stripper plate assembly 72 rockably mounted on a shaft 79. A further reject bin 88 is provided for notes which are retracted from the cash dispenser slot 18, in the event a customer omits to remove them therefrom at the end of a cash withdrawal transaction.

[0019] Referring now to Figure 4A and 4B, the document routing mechanism 50 will be described. The document routing mechanism 50 comprises a gating mechanism 54 at the intersection between the main feed path 46 and the second feed path 48. The gating mechanism 54 includes an isolated support 55 on which first and second flipper arms 56a and 56b are pivotally mounted. A gearing mechanism 58a and 58b is provided on the mutually adjacent ends of each of the flipper arms 56a and 56b, the gear wheels 58a and 58b of which are arranged to mesh such that pivotal movement of one of the flipper arms 56a or 56b will cause pivotal movement of the other flipper arm 56a or 56b. A solenoid mechanism (not shown) is provided to cause pivotal movement of the flipper arms 56a and 56b.

[0020] The auxiliary storage device 52 is shown in more detail in Fig. 5, but it should be appreciated that the device may take a variety of other physical forms such as, for example, a storage stack. The auxiliary stor-

age device 52 is operated on a "last in first out" (LIFO) basis and is preferably chosen to have less inertia than the currency cassettes 40, so that it can dispense notes at a faster rate than dispensing from the currency cassettes 40. The auxiliary storage device 52 comprises a main storage drum 90, first and second tape feeder drum means 92 and 94 which are rotatably mounted within a housing 96. A first tape 97 is secured at one end to the main storage drum 90 and at its opposite end to the first feeder drum means 92, while a second tape 98 is secured at one end to main storage drum 90 and at its opposite end to the second feeder drum means 94, the tapes 97 and 98 being wound about the main drum 90 and their respective feeder drums means 92 and 94. It should be understood that each tape 97 and 98 could comprise two or more separate tapes spaced apart along the axis of the main storage drum, while each tape feeder drum means 92 and 94 could comprise two or more separate drums spaced apart along a common axis.

[0021] In a depositing mode, notes are directed by the document routing mechanism 50 from the main feed path 46 to the second feed path 48 and are fed into the auxiliary storage device 52 where they pass between the tapes 97 and 98. The main drum 90 is driven to rotate in a clockwise direction (with reference to Fig. 4) winding the tapes 97 and 98 and notes held therebetween, onto the main drum 90. Hence, the notes are securely held on the main drum 90 between wrappings of the tapes 97 and 98. In a dispensing mode, the feeder drum means 92 and 94 are driven to rotate in a clockwise direction, causing the tapes 97 and 98 to wind off the main drum 90 and the individual notes to be unloaded and fed out of the auxiliary storage device 52 onto the second feed path 48.

[0022] Referring again to Figures 3, 4A and 4B, the operation of the ATM embodying the present invention will now be described. In order to increase the efficiency and speed at which notes can be dispensed to a customer, notes are periodically transferred from the currency cassettes 40 to the auxiliary storage device 52. The notes to be transferred are picked from the cassettes 40 by the picker devices 44 and are fed by the transport mechanism 45 along the main feed path 46, the direction of feed of the notes being perpendicular to their long dimensions. If the presence of multiple superposed notes is detected by the detector 62, the divertor 60 is controlled to pivot to a position in which passage of the notes along the main feed path 46 is blocked and the multiple note is directed via rolls 59 into a reject bin 64.

[0023] An energisation signal is transmitted to the solenoid of the gating mechanism 54 by the controller unit 32. Energisation of the solenoid causes pivotal movement of the flipper arm 56a in an anticlockwise direction (with reference to Figures 4A and 4B) into the first feed path 46 so as to block the passage of documents to continuation portion 46a thereof. Pivotal movement of the flipper arm 56a causes pivotal movement of the other flipper arm 56b in a clockwise direction (with reference to Figures 4A and 4B) so as to define a path from the first feed path 46 to the second feed path 48 as is shown in Figure 4B. The flipper arms 56a and 56 b are retained in the relative positions shown in Figure 4B under the action of resilient return means (not shown) associated with the solenoid (not shown). In this position, the picked notes are therefore directed from the main feed path 46 to the second feed path 48 and are then fed to the auxiliary storage device 52 for storage. When the transfer process is completed, the solenoid is de-energised causing pivotal movement of the flipper arm 54a in a clockwise direction (with reference to Figures 4A and 4B), out of the first feed path 46 and the continuation portion 46a thereof, and pivotal movement of the flipper arm 54b in an anticlockwise direction (with reference to Figures 4A and 4B) into the second feed path 48 to the rest position shown in Figure 4A. It should be understood that the denomination of the notes and the order in which they are transferred to the auxiliary storage device 52 is stored in the memory 34 of the ATM controller unit 30.

[0024] Notes stored in the auxiliary storage device 52 may be dispensed during subsequent customer transactions in preference to, or in addition to, notes from the currency cassettes 40. If at least some of the required notes are available in the auxiliary storage device 52, they are dispensed therefrom on a "last in first out" basis (LIFO) and fed along the second bi-directional feed path 48 towards the gating mechanism 54. The flipper arms 54a and 54b remain in the rest position shown in Figure 4A and direct the notes being fed along the second feed path 48 to the continuation portion of the main feed path i.e. path 46a.

[0025] The notes are then fed along the continuation portion 46a of the main feed path towards the stacking wheel 70 to be loaded onto a stationary belt 80. Each note enters between adjacent tines 77 of the stacking plates 74 and is carried partly around the axis of the stacking wheel 70. The notes are stripped from the wheel 70 by the fingers 78 of the stripper plate 72, and are stacked against the belt 80 with a long edge of the note resting on the stripper plate assembly 72. The belt 80 co-operates with a pair of rockably mounted belts 82 (only one of which is shown) which are rocked in a clockwise direction so as to trap the stack of notes between the belts 80 and 82. The belts 80 and 82 are then operated to drive the stacked notes to another pair of belts 84 and 86, which are in turn driven to transport the stack of notes through a shutter 89 to a position where the stack of notes extends through the cash dispenser slot 18 in the user panel 12 of the ATM.

[0026] In the event that a customer fails to remove the notes which extend through the cash dispenser slot 18, the notes are retracted back through the shutter 89 on elapse of a predetermined period of time, to avoid the notes being picked up by someone else. The belts 84

deflecting means (56a) includes first gearing mechanism (58a) and the second deflecting means (56b) includes second gearing mechanism (58b), the second gearing mechanism (58b) being arranged to mesh directly with the first gearing mechanism (58a).

5. A document routing mechanism (50) according to any preceding claim, characterized in that each of the first and second deflecting means (56a, 56b) comprises a pivotally mounted deflecting member.

6. A document routing mechanism (50) according to any preceding claim, characterized in that it further comprises an electro-mechanical drive means for driving the deflecting means (56a, 56b) between a first position in which documents may be directed from the first feed path (46) to the continuation portion (46a) of the first feed path (46) or from the second feed path (48) to the continuation portion (46a) of the first feed path (46), and a second position in which documents may be directed from the first feed path (46) to the second feed path (48).

7. A document routing mechanism (50) according to claim 6, characterized in that the electro-mechanical drive means is energised only when documents are to be delivered from the first feed path (46) to the second feed path (48).

8. A document routing mechanism according to any preceding claim, characterized in that it is associated with a document storage device (52).

9. An automated teller machine (ATM) (10) including a document routing mechanism (50) according to any preceding claim.

FIG. 1

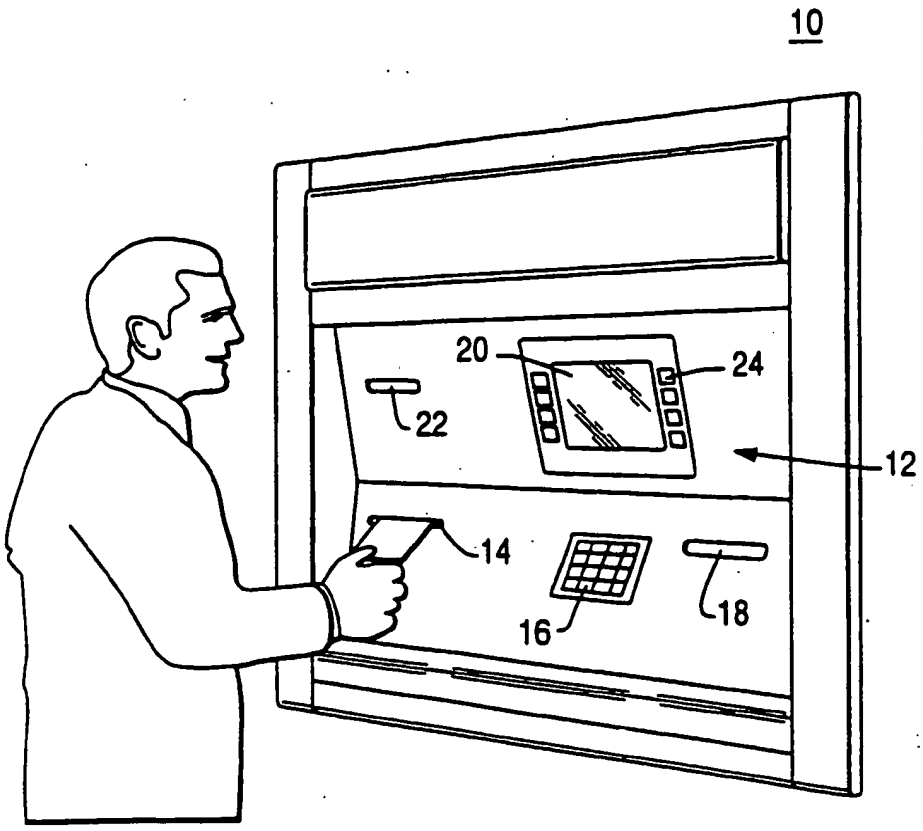


FIG. 4A

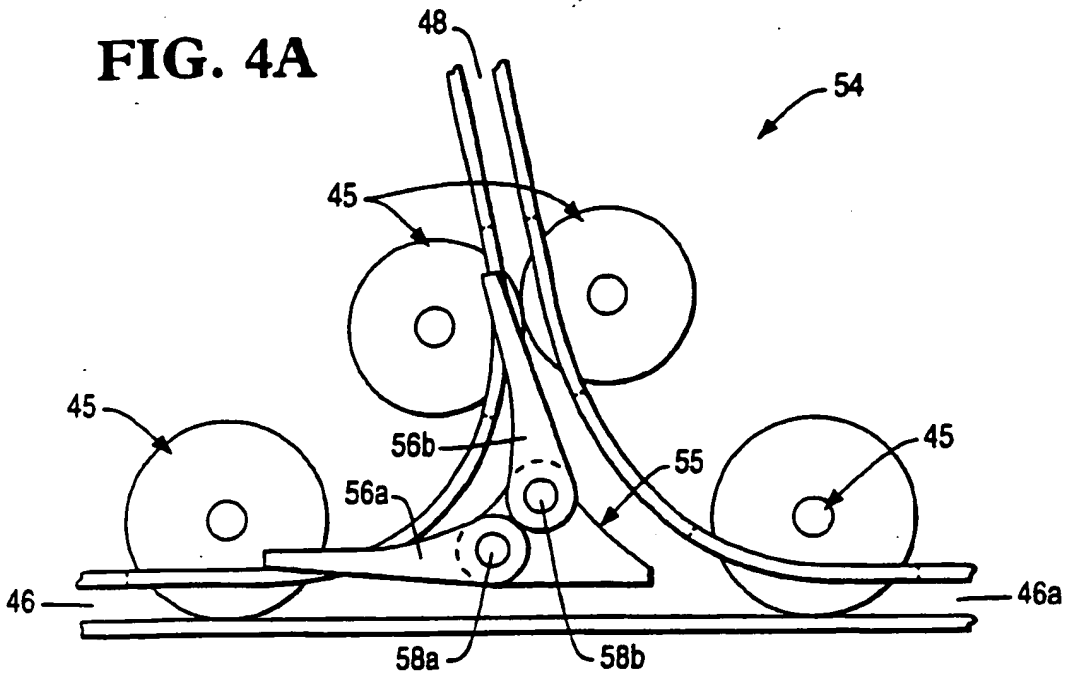

48
54
45
45
45
56b
55
56a
46
46a
58a
58b

FIG. 4B

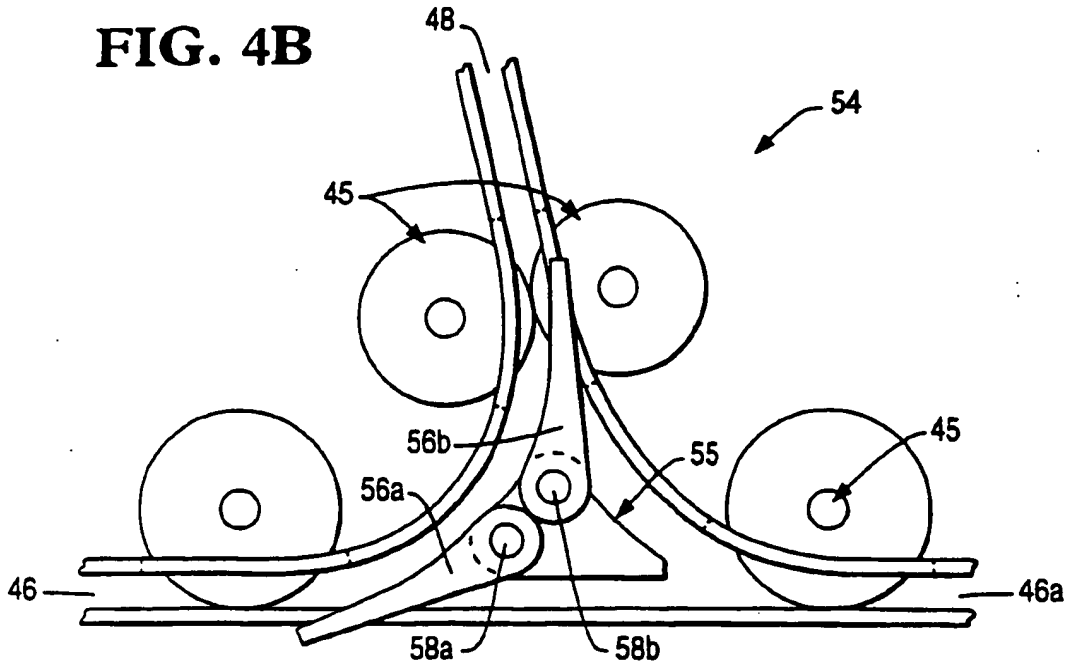
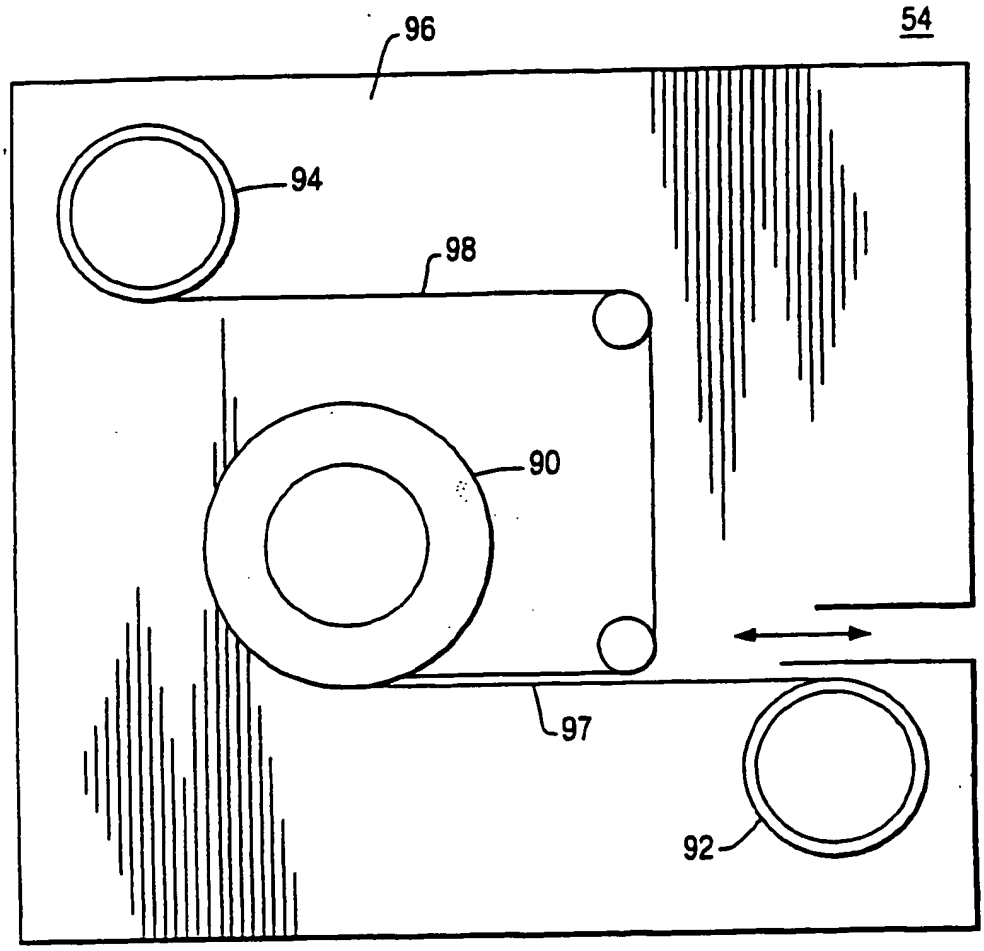

48
54
45
56b
55
45
56a
46
46a
58a
58b

FIG. 4



European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 98 30 8822

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
Y	WO 96 15511 A (MARS INC.) 23 May 1996 * page 2, line 6 - page 4, line 3; figures 1-3 *	1-3,5-9	G07D9/00 B65H29/58
Y	WO 96 26504 A (ASCOM AUTELCA) 29 August 1996 * page 11, line 17 - page 12, line 26; figures 2-4 *	1-3,5-9	
A	EP 0 182 137 A (AUTELCA) 28 May 1986 * page 9, line 25 - page 11, line 11; figure 6 *	1-3,5-9	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)
G07D
B65H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	19 February 1999	Neville, D

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 98 30 8822

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

19-02-1999

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9615511 A	23-05-1996	US 5735516 A	07-04-1998
		AU 3814895 A	06-06-1996
		DE 69505556 D	26-11-1998
		EP 0791211 A	27-08-1997
		ES 2122689 T	16-12-1998
		JP 10508962 T	02-09-1998
WO 9626504 A	29-08-1996	AT 171293 T	15-10-1998
		AU 4661696 A	11-09-1996
		CA 2213407 A	29-08-1996
		DE 59600574 D	22-10-1998
		EP 0811208 A	10-12-1997
		ES 2124082 T	16-01-1999
		JP 11500552 T	12-01-1999
EP 182137 A	28-05-1986	US 4669393 A	02-06-1987

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82